

PRESENTATION OF THE CLAIMS

This listing of the claims will replace all prior versions and listings of claims in the above-identified application:

1. (currently amended) A vehicle seat suspension comprising:
 - a base;
 - a seat supporting platform;
 - a suspension module that communicates with the base and the seat supporting platform that includes a frame supported by one of the base and seat supporting platform, a pivotable arm disposed between the base and platform, and a biasing element that cooperates with the frame and the pivotable arm in opposing suspension collapse;
 - wherein the pivotable arm comprises a bellcrank arm;
 - wherein the frame comprises a fore-aft extending tubular housing; and
 - wherein the biasing element comprises at least one fore-aft extending spring carried by the tubular housing with the at least one fore-aft extending spring being movable relative to the tubular housing without substantially changing spring tension during height adjustment and being movable relative to the tubular housing by changing spring tension during weight adjustment.
2. (currently amended) The vehicle seat suspension of claim 1 further comprising a pivotable scissors linkage arrangement disposed between the base and the seat supporting platform and wherein base and the seat supporting platform each comprise a pan and wherein the suspension module is mounted to one of the base and the seat supporting platform wherein the frame comprises an elongate fore-aft extending tubular housing and the biasing element comprises at least one fore-aft extending elongate spring carried by the housing and wherein the at least one spring is movable relative to the housing.

3. (currently amended) The vehicle seat suspension of claim 2 wherein the tubular housing has a front end disposed toward a front of the vehicle seat suspension and a rear end disposed toward a rear of the vehicle seat suspension, the pivotable arm comprises an arm of a bellcrank arm is pivotally operatively connected by a pivot to the tubular housing adjacent the rear end of the tubular housing with the pivot operatively connected to the at least one fore-aft extending spring and being displaceable relative to the tubular housing during suspension operation and the suspension module is constructed and arranged to enable height and weight adjustment of the suspension, with the at least one spring movable relative to the suspension module frame without substantially changing tension of the at least one spring during height adjustment, and the at least one spring movable relative to the suspension module frame while changing tension of the at least one spring during weight adjustment.

4. (previously presented) The vehicle seat suspension of claim 3 wherein the suspension module is constructed and arranged such that height adjustment is substantially independent of weight adjustment and weight adjustment is substantially independent of height adjustment.

5. (currently amended) The vehicle seat suspension of claim 1 wherein the suspension module comprises a pair of the fore-aft extending springs, a damper, and a roller, wherein the frame comprises a tubular housing has from which the pivotable arm outwardly pivots, which carries a height and weight adjustment assembly that includes a plurality of biasing elements, and a mount disposed inside the housing to which a the damper attaches at one end, wherein the other end of the damper attaches to the bellcrank arm, and wherein the further comprising a roller is rotatively carried by the pivotable bellcrank arm.

6. (currently amended) The vehicle seat suspension of claim 1 wherein the suspension module comprises a height and weight adjustment assembly and wherein the suspension module is engageable with one of the base and platform without any weld.

7. (currently amended) ~~The A vehicle seat suspension of claim 5 comprising:~~
~~a base;~~
~~a seat supporting platform;~~
~~a suspension module that communicates with the base and the platform that comprises a~~
~~frame carried by one of the base and the seat supporting platform, a pivotable arm disposed~~
~~between the base and the seat supporting platform, and at least one biasing element that operably~~
~~cooperates with the frame and the pivotable arm in opposing suspension collapse;~~
~~wherein the suspension module is constructed and arranged to enable height and weight~~
~~adjustment of a seat occupant;~~
~~wherein the suspension module is engageable with one of the base and the seat~~
~~supporting platform without any weld; and~~
~~wherein the suspension module comprises a height and weight adjustment assembly and~~
~~that is preassembled as a unit before being assembled to another part of the vehicle seat~~
suspension.
8. (currently amended) The vehicle seat suspension of claim 4-7, wherein the frame of the suspension module comprises a tubular suspension module housing that has an elongate wall that ~~engages~~ is engageable with one of the base and platform and that has a pair of spaced apart and generally parallel sidewalls extending outwardly from the elongate wall.
9. (previously presented) A vehicle seat suspension comprising:
a base;
a platform;
a linkage arrangement disposed between the base and the platform;
a suspension arrangement that is cooperable with one of the base and the platform, the suspension module further comprising a housing having an elongate wall that is engageable with one of the base and the platform and a plurality of spaced apart sidewalls extending outwardly from the elongate wall and further comprising a damper having at least a portion of which that is disposed in the housing between the sidewalls and adjacent the elongate wall.

10. (previously presented) The vehicle seat suspension of claim 9 wherein the suspension arrangement comprises a suspension module having a movable suspension arm arrangement that is releasably carried by the housing wherein the damper is pivotally mounted at one end to the housing of the suspension module and the damper is pivotally mounted at its other end to a movable arm of the movable suspension arm arrangement.

11. (previously presented) The vehicle seat suspension of claim 10 further comprising at least one biasing element in operable communication with the housing and the movable arm of the movable suspension arm arrangement opposing suspension collapse, wherein each housing sidewall further comprises at least one notch that each pivotably supports a portion of the movable suspension arm arrangement, and wherein the housing is fixable to one of the base and the platform and the movable arm of the movable suspension arm arrangement is rotatable relative to the housing and applies a force against the other one of the base and platform in opposing suspension collapse.

12. (previously presented) The vehicle seat suspension of claim 10 wherein the suspension arrangement further comprises a spring that cooperates with the movable suspension arm arrangement, a manipulable weight adjust handle, an elongate adjuster rod having at least a portion disposed in the housing and which cooperates with the handle and the spring to enable spring tension to be changeable when the weight adjust handle is manipulated, and wherein the linkage arrangement comprises a plurality of spaced apart and parallel scissors linkages.

13. (previously presented) A vehicle seat suspension comprising:

a base that comprises a lower seat pan;

a seat platform that comprises an upper seat pan;

a suspension module in operable communication with at least one of the upper and lower seat pans, the suspension module comprising a frame that supports a bell crank arm assembly having a bell crank arm extending outwardly from the frame that is displaceable relative to the frame; a spring hanger that cooperates with at least one coil spring; an adjuster rod that cooperates with the spring hanger; a weight adjust handle that cooperates with the adjuster rod; and a height adjust handle that cooperates with the adjuster rod;

wherein manipulation of the weight adjust handle rotates the adjuster rod changing spring tension for suspension weight adjust; and

wherein manipulation of the height adjust handle displaces the adjuster rod and the bell crank arm for suspension height adjust.

14. (previously presented) The vehicle seat suspension of claim 13 wherein the suspension module is carried by one of the upper and lower seat pans and further comprising a truncated roller rotatively mounted to the bell crank arm and that is in communication with the other one of the upper and lower seat pans, wherein the truncated roller has a curvilinear contact portion that rotates during suspension travel and a flat re-indexing portion that reorients the truncated roller when it functions as a contact portion, and further comprising a scissors linkage arrangement disposed between the upper seat pan and the lower seat pan.

15. (currently amended) ~~The A vehicle seat suspension of claim 1 comprising:~~

~~_____ a base;~~

~~_____ a seat supporting platform;~~

~~_____ a wherein the suspension arrangement module comprising an elongate tubular frame that is carried by fixable to one of the base and the seat supporting platform without any weld and that comprises a frame, a pivotable arm pivotally extending from the frame that is disposed between the base and the seat supporting platform, a biasing element that cooperates with the pivotable arm in opposing suspension collapse, and further comprising a truncated roller carried by the pivotable arm and that is in operable communication with the other one of the base and the platform that rolls back and forth during suspension operation.~~

16. (currently amended) ~~The A vehicle seat suspension of claim 1 comprising:~~

~~_____ a base;~~

~~_____ a seat supporting platform;~~

~~_____ a wherein the suspension arrangement that is carried by one of the base and the seat supporting platform and that comprises an outwardly extending pivotable arm that is located between the base and the seat supporting platform, a plurality of springs that each cooperate with the pivotable arm in opposing suspension collapse, and further comprising a truncated roller carried by the pivotable arm at or adjacent a free end of the pivotable arm and that is in rotatable communication with the other one of the base and the platform, wherein the truncated roller has an angular extent of no less than about 30° and no greater than about 270°.~~

17. (currently amended) A vehicle seat suspension comprising:

a base;

a seat supporting platform; and

a suspension arrangement carried by one of the base and the platform that comprises a truncated rotatable roller that is in communication with the other one of the base and the platform and that rolls or rocks back and forth during suspension operation.

18. (previously presented) The vehicle seat suspension of claim 17 wherein the suspension arrangement is disposed between the base and platform and wherein the suspension arrangement further comprises a suspension arm that carries the truncated roller and that has an abutment against which a portion of the truncated roller carried by the suspension arm bears thereby limiting roller rotation during suspension operation.

19. (previously presented) The vehicle seat suspension of claim 18 wherein the abutment comprises a slot and the portion of the roller carried by the suspension arm comprises an outwardly extending boss that is received in the slot.

20. (previously presented) The vehicle seat suspension of claim 17 wherein the suspension arrangement comprises a suspension module fixed to either the base or the platform with the suspension module including a suspension arm assembly that comprises the suspension arm and which cooperates with at least one coil spring carried by the module in opposing suspension collapse; a weight adjust assembly comprised of the at least one coil spring that is coupled by a coupling tube and a coupling clip to a manually operable weight adjuster; and further comprising a linkage arrangement disposed between the base and the platform.

21. (original) The vehicle seat suspension of claim 1 wherein the suspension arrangement comprises a suspension arm assembly that is carried by one of the base and the platform that is in communication with a cam and follower arrangement.

22. (original) The vehicle seat suspension of claim 21 wherein the cam comprises a contoured wedge carried by the other one of the base and the platform and the follower comprises a roller that rides along the contoured wedge during suspension operation.

23. (original) The vehicle seat suspension of claim 22 wherein the contoured wedge comprises a ramp and the roller comprises a circular wheel.

24. (original) The vehicle seat suspension of claim 22 wherein the contoured wedge comprises a ramp and the roller is generally U-shaped.
25. (previously presented) A vehicle seat suspension comprising:
- a base;
 - a seat carrying platform;
 - a suspension arrangement carried by one of the base and the platform that comprises at least one biasing element and a suspension arm assembly that includes a pivotable arm extending outwardly toward the other one of the base and the platform that cooperates with the at least one biasing element opposing suspension collapse and further comprising a cam carried by the other one of the base and the platform that cooperates with the pivotable arm during suspension operation permitting relative movement therebetween and that is contoured so as to affect load-deflection characteristics of the suspension.
26. (previously presented) A vehicle seat suspension comprising:
- a base;
 - a seat supporting platform;
 - a suspension linkage arrangement;
 - a suspension arrangement that communicates with the base and the platform and which opposes suspension collapse, the suspension arrangement comprising a rotatable bell crank arm spaced therefrom that extends outwardly toward one of the base and the platform;
 - a cam carried by the one of the base and the platform that cooperates with the bell crank arm of the suspension arrangement and is constructed and arranged to affect suspension load-deflection characteristics.
27. (previously presented) The vehicle seat suspension of claim 26 wherein the cam comprises a ramp that is fixed to one of the base and the platform and cooperation between the bell crank arm and the ramp occurs during relative movement therebetween.

28. (previously presented) The vehicle seat suspension of claim 26 wherein the cam has a substantially linear profile that produces a substantially linear suspension load-deflection curve.

29. (previously presented) The vehicle seat suspension of claim 26 wherein the bell crank arm is carried by the other one of the base and the platform, cooperation between the bell crank arm and the cam occurs during relative movement therebetween via displacement of an end portion of the bell crank arm along the cam. and wherein the linkage arrangement comprises a scissors linkage arrangement that is disposed between the base and the platform.

30. (previously presented) A vehicle seat suspension comprising:
a base;
a seat supporting platform;
a cam carried by one of the base and the platform; and
a bell crank suspension module that is fixable to the other one of the base and the platform, the bell crank suspension module comprising a rotatively displaceable arm extending outwardly therefrom which has a roller capable of riding along at least a portion of the cam during suspension operation.

31. (original) The vehicle seat suspension of claim 30 wherein the cam comprises a ramp and the roller comprises a circular wheel.

32. (previously presented) The vehicle seat suspension of claim 30 wherein the roller has an angular extent of less than 360° such that it comprises a truncated roller and which rolls back and forth along the cam during suspension operation.

33. (original) The vehicle seat suspension of claim 30 wherein the roller comprises a roller that has an angular extent of less than 360° and which has a radius of at least 15 mm.

34. (previously presented) The vehicle seat suspension of claim 30 wherein the cam has a substantially linear cam surface that is upraised relative to the one of the base and the platform and that has an angle of inclination of between 0° and 25° .
35. (original) The vehicle seat suspension of claim 30 where the cam has a minimum height at its highest point of at least 5 mm.
36. (original) A vehicle seat suspension comprising:
a base;
a seat supporting platform;
a cam carried by one of the base and the platform; and
a bell crank suspension arrangement carried by the other one of the base and the platform and which has at least one biasing element and a truncated roller that rides along the cam during suspension operation and which rolls in one direction during suspension collapse and rolls in another direction during suspension expansion.
37. (previously presented) A vehicle seat suspension comprising:
a base;
a seat supporting platform;
a bell crank suspension arrangement fixed to one of the base and seat platform, the bell crank suspension arrangement comprising a housing carrying at least one biasing element, at least one bell crank arm, a weight adjust assembly, and a height adjust assembly, and further comprising a damper carried by the at least one bell crank arm.
38. (previously presented) The vehicle seat suspension of claim 37 further comprising a roller carried by the bell crank arm and wherein the damper has one end pivotally mounted to the at least one bell crank arm and the other end pivotally mounted pivotally mounted to the bell crank suspension housing.

39. (previously presented) The vehicle seat suspension of claim 37 wherein the bell crank suspension housing is of tubular construction and wherein the damper is disposed in the bell crank suspension housing and is operably connected to at least one of the weight adjust assembly and the height adjust assembly.

40. (previously presented) The vehicle seat suspension of claim 37 wherein the weight adjust assembly is constructed and arranged to enable suspension weight adjustment without substantially affecting height adjustment and the height adjust assembly is constructed and arranged to enable suspension height adjustment without substantially affecting weight adjustment.

41. (previously presented) The vehicle seat suspension of claim 37 further comprising a truncated roller rotatively mounted to the at least one bell crank arm.

42. (currently amended) A vehicle seat suspension comprising:

a base;

a seat supporting platform;

a bell crank suspension arrangement module that is mountable to one of the base and the seat supporting platform without any weld with the suspension module comprising a weight adjust assembly and a weight adjust assembly that includes has at least one biasing element that is movable relative to the base and the seat supporting platform, at least one bell crank arm, and a rotatable roller carried by the arm that operably communicates with the other one of the base and seat supporting platform, a weight adjust assembly, and a height adjust assembly; and

wherein the weight adjust assembly is constructed and arranged to enable suspension weight adjustment without affecting suspension height adjustment and the height adjust assembly is constructed and arranged to enable suspension height adjustment without affecting suspension weight adjustment.

43. (currently amended) A vehicle seat suspension comprising:

a base;

a seat supporting platform;

~~a preassembled bell crank suspension arrangement module that is mountable to one of the base and the seat supporting platform comprising a height adjust assembly that includes~~ at least one biasing element, spring, at least one bell crank arm, and a truncated roller carried by the arm disposed in opposition with the other one of the base and the seat supporting platform, a weight adjust assembly, and a height adjust assembly; and

wherein the height adjust assembly has a pair of height adjust limits and is infinitely adjustable between the height adjust limits.

44. (currently amended) A vehicle seat suspension comprising:

a base;

a seat supporting platform;

~~a bell crank suspension arrangement carried by one of the base and the seat supporting platform that comprises a weight adjust assembly and a height adjust assembly that has includes~~ at least one biasing element, at least one bell crank arm, and a truncated roller carried by the arm that is rotatable relative to the bell crank arm, a weight adjust assembly, and a height adjust assembly;

wherein the weight adjust assembly has a pair of weight adjust limits and is infinitely adjustable between the weight adjust limits; and.

wherein the height adjust assembly has a pair of height adjust limits and is infinitely adjustable between the height adjust limits.

45. (previously presented) A vehicle seat suspension comprising:

a base;

a seat supporting platform;

a suspension arrangement that communicates with the base and the platform, the suspension arrangement including an elongate and fore-aft extending suspension component mount of one of the base and the platform generally centrally located relative to the one of the base and the platform and extending outwardly therefrom toward the other one of the base and the platform, the suspension component mount (a) carrying a pair of generally parallel and fore-aft extending elongate biasing elements, (b) pivotally carrying at least one bell crank arm that extends outwardly toward the other one of the base and the platform, and (c) pivotally carrying a damper disposed between the biasing elements that is pivotally connected to the at least one the bell crank arm and that pivotally cooperates with the suspension component mount; and

a linkage arrangement disposed between the base and the platform and spaced from the suspension arrangement.

46. (previously presented) The vehicle seat suspension of claim 45 wherein the damper is parallel with the biasing elements and the biasing elements and the damper all extend generally in a fore to aft direction.

47. (previously presented) A vehicle seat suspension comprising:
- a base;
 - a seat supporting platform;
 - a suspension module that communicates with the base and the platform, the suspension module comprising:
 - a suspension housing;
 - a bell crank arm pivotally mounted to the suspension housing along a first pivot;
 - a spring hanger movable relative to the suspension housing along a guide thereof,
 - a spring retainer spaced from the spring hanger and engaging the bell crank arm at a second pivot defining a moment arm relative to the first pivot, and a plurality of springs disposed between the spring hanger and the spring retainer with each spring having one of its ends in engagement with the spring hanger and the other of its ends in engagement with the spring retainer; and
 - a damper having one end mounted to the suspension housing and the other end mounted to the bell crank arm.

48. (previously presented) A vehicle seat suspension comprising:

a base;

a seat supporting platform;

a linkage arrangement disposed between the base and the platform;

a preassembled suspension module that is fixable to one of the base and platform, the suspension module comprising:

a bell crank arm pivotally mounted at a first pivot and operably cooperable with the other one of the base and the platform; and

a weight adjust assembly that includes at least one biasing element in operable communication at or adjacent one end with the bell crank arm at a second pivot spaced from the first pivot defining a moment arm relative to the first pivot and in operable communication at or adjacent its other end to the one of the base and the platform, and a biasing element preload adjuster that is adjustable for providing suspension weight adjustment.

49. (currently amended) A preassembled suspension module for a vehicle seat suspension comprising:

a suspension module housing fixable to a part of the vehicle seat suspension that comprises:

a plurality of biasing elements carried by the suspension module housing that are displaceable relative to the suspension module housing for enabling one of height adjustment and weight adjustment; and

a bell crank suspension arm pivotally carried by the suspension module housing and in cooperation with the plurality of biasing elements opposing vehicle seat suspension collapse.

50. (canceled)

51. (canceled)

52. (canceled)

53. (canceled)

54. (previously presented) A suspension module for a vehicle seat suspension comprising:
a suspension module housing that is fixable either to a seat supporting platform or a base;
a bell crank arm pivotally attached to the housing at a first pivot;
a biasing element hanger disposed in a slot in the housing that guides movement of the hanger relative to the housing, a biasing element retainer attached to the bell crank arm at a second pivot, and at least one biasing element in operable communication with the hanger and the retainer; and
a damper that is pivotally attached to the housing and that is pivotally attached to the crank arm.

55. (previously presented) A suspension module for a vehicle seat suspension comprising:
a suspension module housing that is fixable to one of a seat supporting platform and a base;
a bell crank arm pivotally attached to the housing at a first pivot at or adjacent one end and having a roller rotatively attached at or adjacent the other end that cooperates with the other one of the seat supporting platform and the base;
a biasing element hanger disposed in a slot in the housing that guides movement of the hanger relative to the housing, a biasing element retainer attached to the bell crank arm at a second pivot, and at least one biasing element in operable communication with the hanger and the retainer;
a weight adjuster constructed and arranged to enable the distance between the hanger and the retainer to be changed to change biasing element preload; and
a height adjuster constructed and arranged to displace the retainer to change suspension height.

56. (previously presented) A suspension module for a vehicle seat suspension comprising:
a suspension module frame that is fixable to one of a seat supporting platform and a base;
a bell crank arm pivotally attached to the frame at a first pivot at or adjacent one end of the bell crank arm;

a biasing element hanger carried by the frame, a biasing element retainer attached to the bell crank arm at a second pivot spaced from the first pivot, and at least one biasing element in operable communication with the hanger and the retainer; and

a height adjuster constructed and arranged to displace the retainer to change suspension height changing an angle of the bell crank arm relative to the frame.

57. (previously presented) A suspension module for a vehicle seat suspension comprising:
a tubular suspension module housing that is fixable to one of a seat supporting platform and a base;

a bell crank arm pivotally attached to the housing at a first pivot at or adjacent one end and having a roller rotatively attached at or adjacent the other end that cooperates with the other one of the seat supporting platform and the base;

a biasing element hanger disposed in a slot in the housing that guides movement of the hanger relative to the housing, a biasing element retainer attached to the bell crank arm at a second pivot, and at least one biasing element in operable communication with the hanger and the retainer;

a weight adjuster constructed and arranged to enable the distance between the hanger and the retainer to be changed to change biasing element preload;

a height adjuster constructed and arranged to displace the retainer to change suspension height; and

a damper having at least a portion disposed in the housing and attached thereto and having at least portion extending alongside the bell crank arm and attached thereto.

58. (currently amended) A suspension module for a vehicle seat suspension comprising:
- a suspension module frame that is fixable to one of a seat supporting platform and a base;
 - a bell crank arm pivotally attached to the housing at a first pivot at or adjacent one end and having a truncated roller rotatively attached at or adjacent the other end that cooperates with the other one of the seat supporting platform and the base; and
 - a biasing element carried by the housing that cooperates with the bell crank arm.